

10/627289

CLAIMS

What is claimed is:

1. A transistor structure, comprising:
 - a gate electrode formed of silicided polysilicon,
 - a gate signal line, and
 - a conductive plug formed of a periodic table column IVB, VB, VIB, and/or VIIB metal, the conductive plug electrically interconnecting the gate electrode and the gate signal line,
 wherein the gate electrode, the conductive plug, and the gate signal line are arranged vertically with respect to a substrate upon which the transistor structure is mounted.
2. The transistor structure of Claim 1, wherein the conductive plug is formed of two or more layers.
3. The transistor structure of Claim 2, wherein each of the two or more layers is formed of a different material.
4. The transistor structure of Claim 1, wherein the conductive plug has a rectangular or squarish cross section.
5. The transistor structure of Claim 4, wherein the conductive plug has a width between 120 nm and 400 nm, inclusive, a length between 120 nm and 400 nm, inclusive, and a height between 200 nm to 500 nm.
6. The transistor structure of Claim 5, wherein the conductive plug has a width of 160 nm, a length of 160 nm, and a height of 280 nm.

7. The transistor structure of Claim 1, where in the gate electrode has a generally rectangular shape.

8. The transistor structure of Claim 7, wherein the gate electrode has a length between 2 microns and 10 microns, a width between 300 nm and 1 micron, and a thickness between 120 nm and 300 nm.

9. The transistor structure of Claim 8, wherein the gate electrode has a length of 4.8 microns, a width of 420 nm, and a height of 180 nm.

10. The transistor structure of Claim 1, wherein the conductive plug is formed of chromium or molybdenum.

11. The transistor structure of Claim 1, wherein the conductive plug is formed of tungsten.

12. The transistor structure of Claim 1, wherein the gate signal line is formed of copper.

13. The transistor structure of Claim 1, wherein the gate signal line is formed of aluminum.

14. The transistor structure of Claim 1, wherein the gate electrode is shared with other transistor structures.

15. The transistor structure of Claim 14, wherein some of the other transistor structures do not include a conductive plug.

16. The transistor structure of Claim 14, wherein all the other transistor structures include conductive plugs.

17. The transistor structure of Claim 14, wherein the transistor structure has a second conductive plug.

18. A method of forming a transistor structure, comprising:
 - forming a drain diffusion region and a source diffusion region on a semiconductor material;
 - forming a drain contact on the drain diffusion region and a source contact on the source diffusion region;
 - forming a gate dielectric layer over a channel region in the semiconductor material between the source and drain contacts;
 - forming a polysilicon gate electrode on the gate dielectric layer;
 - forming a metal plug on the polysilicon gate electrode; and
 - forming a gate signal line over the metal plug,wherein the metal plug electrically interconnects the gate signal line and the polysilicon gate electrode,
 - wherein the material of the metal plug does not react with the polysilicon material polysilicon gate electrode and forms a good conductive connection with polysilicon and the material of the gate signal line,
 - wherein the gate signal line is disposed over the channel region.
19. The method of Claim 18, wherein the drain and source contacts are silicided.
20. The method of Claim 18, wherein the polysilicon gate electrode is silicided.
21. The method of Claim 18, wherein the polysilicon gate electrode is silicided.
22. The method of Claim 18, wherein the metal plug includes tungsten.

23. A signal driver having a plurality of low gate resistance radio frequency transistors that share a polysilicon gate electrode, comprising:

multiple radio frequency transistors formed in parallel such that drain contacts of the multiple radio frequency transistors are arranged in a line and source contacts of the multiple radio frequency transistors are arranged in a line, the multiple radio frequency transistors sharing a polysilicon gate electrode; and

metal plugs formed in electrical contact with the polysilicon gate electrode along the length of the polysilicon gate electrode.

24. The signal driver of Claim 23, wherein the metal plugs electrically interconnect the polysilicon gate electrode with a gate signal line.

25. The signal driver of Claim 23, wherein the polysilicon gate electrode is salicided.

26. The signal driver of Claim 23, wherein the metal plugs are formed of tungsten.

27. The signal driver of Claim 23, wherein the metal plugs are formed of one or more of a periodic table column VIB metal and a refractory metal.